Fundamentals of Nanoelectronics, II: Energy Band Model

Prof. Supriyo Datta

L2.5 Quiz

Answers

2.5. Number of modes

2.5a. A material with an energy momentum relation $E(p) = E_c + K p^a$, has

(d: number of dimensions, K: positive constant)

(a) $M(E) \sim (E - E_c)^{d/a}$

(b) $M(E) \sim (E - E_c)^{(d+1)/a}$

(c) $M(E) \sim (E - E_c)^{(d-1)/a}$

(d) $M(E) \sim (E - E_c)^{(d/a)-1}$

(e) none of the above

$M(E) \sim p^{d-1} \sim (E - E_c)^{(d-1)/a}$

2.5b. A material with an energy momentum relation $E(p) = \sqrt{E_g^2 + n_0^2 p^2}$, has

(d: number of dimensions, n_0; constant)

(a) $M(E) \sim \left(E^2 - E_g^2\right)^{d/2}$

(b) $M(E) \sim \left(E^2 - E_g^2\right)^{(d/2)-1}$

(c) $M(E) \sim \left(E^2 - E_g^2\right)^{(d+1)/2}$

(d) $M(E) \sim \left(E^2 - E_g^2\right)^{(d-1)/2}$

(e) none of the above

$M(E) \sim p^{d-1} \sim \left(\sqrt{E^2 - E_g^2}\right)^{(d-1)}$